

## 1. Roll-Call: please sign up on the telecon notes pages

<b>STDT members</b>		<b>Study Office members</b>	
<b>here</b>	Allen, Steve		Gelmis, Gregg
*	Bautz, Mark		King, Mark
<b>On travel</b>	Brandt, Niel	<b>das</b>	Schwartz, Dan
<b>On travel</b>	Bregman, Joel		Schwartz, Eric
<b>On travel</b>	Donahue, Megan	*	Swartz, Doug
	Evans, Dan	<b>ht</b>	Tananbaum, Harvey
	Gaskin, Jessica	<b>here</b>	Weisskopf, Martin
*	Hickox, Ryan		Daniel Castro
<b>ahc</b>	Hornschemeier, Ann		David Ardila
	Jeltema, Tesla		
	Kollmeier, Juna		
<b>lal</b>	Lopez, Laura		
	Madau, Piero		
<b>brm</b>	McNamara, Brian		
	Nandra, Paul		
<b>On travel</b>	Osten, Rachel		
	Ozel, Feryal		
<b>On travel</b>	Paerels, Frits		
	Parmar, Arvind		
*	Petre, Rob		
	Pivovarovoff, Mike		
*	Pooley, Dave		
<b>gwp</b>	Pratt, Gabriel		
*	Ptak, Andy		
<b>here</b>	Quataert, Eliot		
	Reynolds, Chris		
	Smith, Randall		
*	Stern, Daniel		
<b>x</b>	Tashiro, Makoto		
*	Vikhlinin, Alexey		

## 2. Science Direction Survey

**NOTE:** In the spreadsheet, whoever has editor privileges can click:  
[Format -> Text Wrapping -> Wrap](#).  
 (Overflow is the default)(das)

### **A Preliminary Grouping of Science Topics:**

Baryons in the Circumgalactic Medium:

- Baryon content

- Effect of Feedback on CGM
- Effect of CGM on Star Formation
- Effect of CGM on fueling the AGN
- Starburst-driven outflows

#### Supermassive Black Holes:

- Masses and Origins of Seeds
- Growth at high redshift
- Feedback
- Spins
- [Accretion Physics \(e.g. hot v. cold accretion, resolving Bondi radii\) Steve A.](#)

#### Clusters:

- Cosmology with Clusters
- Turbulence and bulk motion of the ICM ([maybe go with Physics of ICM and evolution of ICM as separate topics? Emphasis on high spatial/spec res. Steve A.](#))
- Enrichment of the ICM

#### Fundamental Physics:

- Dense Matter Equation of State through neutron star radii and masses
- Black Hole Spacetimes (via iron lines and reverberation)
- Sterile Neutrinos -- Dark Matter

#### Stellar Physics:

- Atmospheres of Stars
- Transient Mass Loss
- Supernova Remnants: progenitors, explosions, particle acceleration
- Exoplanet studies

#### X-ray Binaries

- Binaries, including in
- Globular Clusters and at High Redshift,
- ULXs

#### Time Domain:

- LSST Transient Follow-up
- Quasar Microlensing -- sizes of accretion disks, DM distribution
- X-ray Pulsar Spectroscopy
- QPOs in X-ray binaries
- [\(also reverberation mapping in binaries? - will likely push time res. Down to ~1-10 micros? Steve A.\)](#)
- [AGN variability](#)

**Energy Band:**

0.1--10 keV, except for nonthermal cluster emission

Higher energy capabilities may be required for: iron lines, Compton hump, ULXs (we will inquire how high we can go -- 30 keV? -- and the trade-offs for this would be)

**Energy Resolution:**

At a first glance, roughly  $\frac{1}{3}$  each for

- CMOS/CCD with  $\Delta E = 100$  eV
- Gratings with  $R \sim 5000$
- Calorimeter with  $\Delta E < 20$  eV (cluster physics needs <few eV Steve A.)

**Timing Resolution:**

Of the order of  $\sim 1$  s, with possible exception of transients that require 0.1 s

A couple of science topics will require much higher (millisecond-10 microsec) resolution

Will study this trade-off

**Angular Resolution:**

Nearly all respondents indicated need for  $\sim 0.5$  arcsec

In the trade study, explore whether 0.2" is achievable/needed

**Sensitivity Limit:**

Depending on the science goal,  $10^{-16}$  --  $10^{-19}$  erg  $s^{-1}$   $cm^{-2}$

As a point of comparison, Chandra's limit is roughly  $10^{-17}$

Additional discussion items: capability to respond to fast TOO's

"Fast" needs to be quantified. E.g., <2 hrs implies certain reaction wheel capability.

< few hours implies Operations staffing level and accessibility to ground stations.

<  $\sim 24$  hours implies a high fidelity command generation system requiring no human Review. (das)

### 3. Meeting schedule

A science-focused F2F meeting in the Fall?

Dates for the Spring '17 science workshop in Washington, DC?

### 4. Miscellaneous

- Summer telecon schedule

- We may be able to get a presentation / Q&A session from Gary Blackwood (Exoplanet Exploration Program) on the study plan, CML's, procedure for assessing CML's, etc. *Do we want this?* FYI, here is a link to the "original" CML paper, which provides a bit more information than the presentations: [13-3547\\_A1b.pdf](#)